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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,479	09/24/2003	Steven G. Goebel	GP-303584	3973
7590 05/31/2007				
CARY W. BROOKS		EXAMINER		
General Motors Corporation		HODGE, ROBERT W		
Legal Staff, Mail Code 482-C23-B21				
P.O. Box 300		ART UNIT PAPER NUMBER		
Detroit, MI 48265-3000		1745		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/669,479

Applicant(s)

GOEBEL ET AL.

Examiner

Robert Hodge

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 May 2007.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 13-27, 29-32, 35 and 41 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 13-27, 29-32, 35 and 41 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/1/07 has been entered.

### ***Response to Arguments***

Applicant's arguments, see Remarks, filed 5/1/07, with respect to the rejection(s) of claim(s) 13-27, 29-32, 35 and 41 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of U.S. Patent No. 4,037,023.

The Examiner acknowledges that claims 28, 33-34, 36-40 and 42-45 have been canceled and therefore the rejections of those claims are not moot.

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: the word "of" should be inserted between "both" and "said" in line 15 of the claim. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 13-22, 31 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,037,023 hereinafter Grehier in view of U.S. Patent No. 6,544,681 hereinafter McLean.

As seen in figures 9 and 11 Grehier teaches an electrochemical cell comprising a membrane electrode assembly (15 and E<sub>1</sub>-E<sub>5</sub>) defining anode and cathode sides that interposes respective flow field plates associated with them, wherein the flow field plates each have channels 14 that are substantially serpentine and are separated by lands and the lands are provided in a pattern of alternating angles and crests in a plane to both of said flow field plates, said pattern of lands being orientated relative to each other across the membrane electrode assembly (15 and E<sub>1</sub>-E<sub>5</sub>), such that the lands crisscross along said alternating angles and overlap on said crests (see also column 2, lines 25-27 and column 3, line 39 – column 4, line 11).

Grehier does not teach that a pitch defined by one flow field plate is great than a pitch of the other, or any other details outlined in the above listed dependent claims with regards to the pitch and cross-sectional dimensions, or that the fuel cell is a proton exchange membrane fuel cell.

McLean teaches a proton exchange membrane (PEM) type fuel cell system comprising a membrane electrode assembly (MEA) defining anode and cathodes sides, having a first flow field plate for the cathode side defined by first channels and lands, a

second flow field plate for the anode defined by second channels and lands with the MEA interposed between the first and second flow field plates, wherein the pitch of the first flow field plate is less than a pitch of the second flow field plate and said pitch defined by the second flow field plate is approximately twice as large as that defined by the first flow field plate, wherein a substantial number, majority and substantially all of the second lands have a cross sectional width wider than that of a substantial number, majority and substantially all of the first lands. McLean further teaches that the channels are either predominately straight or serpentine in orientation (abstract, figure 3, column 1, line 14 – column 2, line 36, column 3, line 60 – column 4, line 57, column 6, line 50 – column 8, line 42). The Examiner notes that figure 3 is only one of many bipolar plates that are provided within the fuel cell stack and therefore since channels 34 are for Hydrogen and 36 are for Oxygen a MEA would be present on both sides of the plate and subsequent plates would be stacked respectively against the MEAs thereby providing multiple plates as required by the instant claims.

At the time of the invention it would have been obvious to one having ordinary skill in the art to optimize the pitches and cross-sections as well as providing a proton exchange membrane in Grehier as taught by McLean in order to provide a fuel cell that would be optimized by reducing the size of the flow field plate and reduce the amount of material required to manufacture the plate, thereby allowing for a more compact and lighter design, which is the intent of Grehier. It is also clear that Grehier is also concerned with optimizing the geometric configurations of the channels as outlined in column 3, lines 54 et seq. It would have also been obvious to one having ordinary skill

in the art at the time the invention was made to optimize the field flow plates of Grehier as taught by McLean since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results. In re Boesch, 617 E.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 23-27, 29, 30, 32 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grehier in view of McLean as applied to claim 13 above, and further in view of U.S. Pre-Grant Publication No. 2002/004158 hereinafter Suzuki.

Grehier as modified by McLean does not teach the specific dimensions recited in the above listed claims, the specific land-to-land alignment across the membrane electrode assembly or that the fuel cell is provided in a vehicle.

Suzuki teaches a proton exchange membrane fuel cell for an automobile comprising membrane electrode assemblies which have two field flow plates having a plurality of channels wherein a substantial number, a majority and substantially all of the channel widths are approximately equal wherein the channels are designed to be varied in shape and pattern, where the channels can be different sizes, and cross sectional areas that have the same specific dimensions as those claimed in the present application, as well as orienting lands in parallel planes at an angle from 0 to 90 degrees such that a land contact on both sides of the MEA is between 20% and 50% and the pitch of the channels can be varied (figures 3, 4 and 5 and paragraphs [0002], [0023]-[0026], [0056]-[0059], [0063], [0066]-[0070], [0078]-[0079] and [0084]). Suzuki also teaches many different formulae for optimizing all of the dimensions of the field flow plates as can be seen throughout the entire disclosure.

At the time of the invention it would have been obvious to one having ordinary skill in the art to further optimize the dimensions of the flow field plates as well as their land-to land alignment across the membrane electrode assembly of Grehier as modified by McLean as taught by Suzuki in order to provide a fuel cell that would be further optimized by reducing the size of the flow field plate and reduce the amount of material required to manufacture the plate, thereby allowing for a more compact and lighter design, which is the intent of Grehier. As well as providing a fuel cell in a vehicle in order to replace the internal combustion engine that would in turn provide a vehicle that operates using clean energy and reducing pollutants released to the atmosphere. It would have also been obvious to one having ordinary skill in the art at the time the invention was made to optimize the field flow plates of Grehier as modified by McLean as taught by Suzuki since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, in the absence of unexpected results. In re Boesch, 617 E.2d 272, 205 USPQ 215 (CCPA 1980).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Hodge whose telephone number is (571) 272-2097. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RWH



**JONATHAN CREPEAU**  
**PRIMARY EXAMINER**